

## WHAT IS CLAIMED IS:

1. A fuel injection system for an internal combustion engine, comprising:  
an intake pipe equipped with a throttle valve;  
an upstream fuel injection valve provided upstream from said throttle valve; a  
downstream fuel injection valve provided downstream from said throttle valve;  
means for detecting a process value representing an operating state or a traveling  
state of the internal combustion engine; and  
means for restricting fuel injection of each of said fuel injection valves when said  
process value reaches a predetermined upper limit value,  
wherein said upstream fuel injection valve and said downstream fuel injection  
valve differ in an upper limit value at which said fuel injection is restricted.
2. The fuel injection system for an internal combustion engine according to  
claim 1, wherein said means for restricting said fuel injection stops fuel of said upstream  
fuel injection valve and causes said downstream fuel injection valve to perform a  
thinned-out injection.
3. The fuel injection system for an internal combustion engine according to  
claim 1, further comprising an injection rate determination unit including a matrix of  
predetermined throttle opening and engine speed values for determining the upper limit  
value at which said fuel therein is restricted.
4. The fuel injection system for an internal combustion engine according to  
claim 1, wherein the upper limit value of the upstream fuel injection valve is lower than  
the upper limit value of the downstream fuel injection valve.



5. The fuel injection system for an internal combustion engine according to claim 1, wherein the fuel injection of the upstream fuel injection valve is stopped prior to the fuel injection of the downstream fuel injection valve.

6. The fuel injection system for an internal combustion engine according to claim 2, further comprising an injection quantity restriction unit having a predetermined thinned-out pattern for each of a plurality of gear positions.

7. The fuel injection system for an internal combustion engine according to claim 2, wherein said means for restricting said fuel injection stops fuel of said upstream fuel injection valve and causing said downstream fuel injection valve to perform the thinned-out injection is activated when an engine speed approaches a predetermined upper output limit.

8. A fuel injection system for an internal combustion engine, comprising:  
an intake pipe equipped with a throttle valve;  
an upstream fuel injection valve provided upstream from said throttle valve;  
a downstream fuel injection valve provided downstream from said throttle valve;  
means for detecting a process value representing an operating state or a traveling state of the internal combustion engine;

means for detecting whether or not said process value reaches a quasi-upper limit value representing a value smaller than a predetermined upper limit value;

means for restricting, when said process value reaches said quasi-upper limit value, fuel injection of said upstream fuel injection valve; and

means for restricting, when said process value reaches said upper limit value, fuel injection of said downstream fuel injection valve.



9. The fuel injection system for an internal combustion engine according to claim 8, wherein said means for restricting said fuel injection stops fuel of said upstream fuel injection valve and causes said downstream fuel injection valve to perform a thinned-out injection.

10. The fuel injection system for an internal combustion engine according to claim 8, further comprising an injection rate determination unit including a matrix of predetermined throttle opening and engine speed values for determining the upper limit value at which said fuel therein is restricted.

11. The fuel injection system for an internal combustion engine according to claim 8, wherein the upper limit value of the upstream fuel injection valve is lower than the upper limit value of the downstream fuel injection valve.

12. The fuel injection system for an internal combustion engine according to claim 8, wherein the fuel injection of the upstream fuel injection valve is stopped prior the fuel injection of the downstream fuel injection valve.

13. The fuel injection system for an internal combustion engine according to claim 9, further comprising an injection quantity restriction unit having a predetermined thinned-out pattern for each of a plurality of gear positions.

14. The fuel injection system for an internal combustion engine according to claim 9, wherein said means for restricting said fuel injection stops fuel of said upstream fuel injection valve and causing said downstream fuel injection valve to perform the thinned-out injection is activated when an engine speed approaches a predetermined upper output limit.



15. A method for injecting fuel in an internal combustion engine with a fuel injection system, the fuel injection system having an intake pipe equipped with a throttle valve; an upstream fuel injection valve provided upstream from said throttle valve; a downstream fuel injection valve provided downstream from said throttle valve, the method comprising the steps of:

detecting a process value representing an operating state or a traveling state of the internal combustion engine;

restricting fuel injection of each of said fuel injection valves when said process value reaches a predetermined upper limit value; and

stopping said fuel injection of the upstream fuel injection valve prior to said the fuel injection of the downstream fuel injection valve.

16. The method for injecting fuel in an internal combustion engine according to claim 15, further comprising the step of arbitrarily adjusting fuel distribution between the upstream fuel injection valve and the downstream fuel injection valve based the process value detected.

17. The method for injecting fuel in an internal combustion engine according to claim 15, wherein the predetermined upper limit values of the upstream fuel injection valve and the downstream fuel injection valve are function of a throttle opening value and an engine speed value.